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06FEB04 E871253-1 B21166
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3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

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Patents ADP number *(if you know it)* 8803637001

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

CANDLE SCENT DELIVERY PELLET

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

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Continuation sheets of this form	0
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Signature(s) BRuff Date 5-Feb-2004

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

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CANDLE SCENT DELIVERY PELLET

Description

This invention relates to a concentrated scented pellet of a suitable bulk material such as wax, of a suitable size, and of a suitable shape for ergonomic, safe and dry delivery of this scent into the melt pool of a wax candle, which is either currently burning or which is still hot after recently burning, and this pellet is so constructed that it melts and mixes into the melt pool of the candle once added for the purpose of releasing the scented material within the pellet into the melt pool as the bulk material of the pellet melts so mixing this scent with the candle melt pool for the purpose of giving the candle a scent while the candle burns.

Commercially available candles are generally made of either a synthetic wax such as paraffin wax, or an organic wax such as a plant or animal wax eg beeswax. Lower cost mass produced candles tend to be made from paraffin wax.

Scented candles are commonly availably for delivering a pleasant scent to a room while they burn, and in particular wax candles, rather than liquid gel candles, employing a wick are supplied with a scent integrated into the candle wax in a concentration, typically 3% to 5%, suitable for delivering a scent which is neither too weak nor overly strong, and in particular in a concentration that is acceptable for room based use by the consumer and in a concentration that is not dangerously high which could lead to a lower flash point for the candle, particularly relevant for tea lights which achieve a high normal operating temperature. Also, high scent concentrations tend to mechanically weaken the wax leading to a poor quality candle.

Scents available for manufacture of scented candles take many forms including perfume and oil based, and have a great range of fragrance. To assist uptake of scented material into the wax of a candle, additives are frequently added such as the branded chemical *Vybar*. Additives also are commonly used for improving the appearance and strength of the candle, and these additives are largely used because the scented additives adversely affect the mechanical properties of the wax.

The purpose of the invention is to temporarily and changeably introduce scent to an otherwise unscented candle by addition of this scent into the wax melt pool found at the burning end of the candle once the candle flame has established a temperature within the wax around the flame high enough to form this melt pool. Introduction of scent into the candle melt pool by adding a highly concentrated scent pellet has the effect of diluting this scent into the wax melt pool thereby giving the candle a scent while the scented material is being used up, typically by evaporation. The scent in the pellet is diluted into the melt pool from its higher scent concentration in the pellet to a lower concentration suitable for normal operation of a scented candle. Since the scent is only added to the melt pool which has no structural role in the candle then the mechanical strength of the solid part of the candle is unaffected by the introduction of the scented material.

Currently scented candles are supplied with a scent locked into the wax of the candle, and this scent is typically in the form of a fragrance oil or perfume mixed into the bulk wax of the candle. As the candle burns a melt pool is formed around the wick. The scent in this melt pool evaporates or is burned to give the candle a scent, and typically the scent concentration in this melt pool is less than that in the solid part of the candle as necessarily some of the scent has been consumed. Higher concentrations of scent in this melt pool give the candle a stronger scent. It is the melt pool which is largely responsible for the scent of the candle so the melt pool is the active scent production part of the candle and the solid part of the scented candle is simply a store of material waiting its turn to be melted and burned. The characteristics of this melt pool are exploited by the present invention and an object of this invention is to dose the melt pool

with scented material, and preferably to a higher concentration than is normally acceptable or possible in a commercially available candle.

It may be thought that a scented fluid, such as a fragrance oil or perfume, could be poured directly into this melt pool. While this is true, the scent will tend to float on top or sink to the bottom of the melt pool as it is of a different density to the melt pool wax, and mixing will be poor. Also, this is not a very convenient or safe way to add the scent to the melt pool, and risks the concentrated scent material coming in direct contact with the candle flame which could then ignite and be a fire risk and could also promote production of toxic combustion products from the raw scented material. In addition, the scent production of the candle after adding the scent will tend to be non-uniform. The present invention provides a convenient method for adding scent to the melt pool while also adding additional fuel to the candle to assist in its longevity, and as the scented material is locked into the bulk material of the pellet, then the scent is slowly delivered to the melt pool avoiding the fire risks mentioned above while also providing a more uniform release of the scented material into the melt pool thereby promoting uniform mixing of the scent with the wax in the melt pool leading to more uniform scent production by the candle. Accordingly, an object of this invention is to provide a uniform mixing of the scent within the pellet with the wax of the melt pool.

One problem with scented candles is that the scent is locked into the bulk wax of the candle and so the scent that the candle produces while burning is unchangeable for the life of the candle's normal use. In order to change the scent the user must light a candle of a different scent, so to change scent requires an entirely separate candle. It is an object of the present invention that scent is added to an otherwise unscented, ie *virgin*, candle so that the consumer may change the scent of the candle when desired, albeit either the current scent must have dissipated from the melt pool or the melt pool of the candle must have been discarded and a new virgin melt formed by waiting for the wax to form a new melt pool before adding the pellet.

Another problem with pre-scented candles is that the mechanical properties of the candle tend to be compromised by the scented material introduced to produce the scent, and in particular this scented material tends to reduce the mechanical strength of the candle and is a limiting factor in the amount of scent that can be added to the candle before the candle becomes too weak for use. By adding the scent directly to the melt pool of a virgin wax candle, then the strength of the candle is not compromised at all leading to simpler manufacture and shipping, and a better quality product in terms of appearance and strength.

Another problem with pre-scented candles is that high concentrations of scent, which are advantageous in terms of scent production quantity while burning, produce a fire hazard as the higher the scented material concentration, for instance of fragrance oils and perfumes, the lower the flash point of the candle wax. In very high scent concentrations the candle risks flash ignition of the melt pool. This problem is avoided with virgin wax candles using the scented pellet invention since as only the melt pool is dosed with scent, then the flash point of the bulk candle itself is not compromised. In an extreme situation where the candle melt pool is highly dosed with scented pellets then the wick tends to be swamped by the additional wax of the scent pellets so either reducing the flame or extinguishing the candle, and this is an inherently safe negative feedback system. Should the melt pool actually ignite at its flash point, then this flame will quickly extinguish as the oil/scent combustible material within the melt pool is used up since the candle itself has no further oil/scent to add to the pool to sustain the flame.

Another advantage of this invention is that the virgin wax candle to which the scent pellets are added are much cheaper and more readily available than pre-scented candles. In practice, adding

)scent pellet to a virgin wax candle is inherently cheaper and more controllable for the consumer than buying pre-scented candles.

Though not necessarily an advantage, a distinguishing property of this invention is that as only the melt pool of the candle is directly dosed with the pellet and the materials contained within it then the colour of the candle is not affected other than in and around the melt pool. In practice this allows the end user of the candle to choose a candle colour according to appearance rather than scent and this choice is limited only by the availability of colours, shapes and sizes supplied by manufacturers. In the case of pre-scented candles, the colour of the candle is often affected by the scent material, and in any case a pure white candle is difficult to achieve with scented additives but easy to achieve with virgin wax, and this colour is not affected by the addition of a scent pellet other than in melt pool and immediate environs.

Typically the bulk material of the scented pellet in the present invention is a wax and preferably suitably chosen for holding high concentrations of scented material, and to this wax may also be added ingredients for improving uptake of scents into this material, for instance Vybar for waxes such as paraffin wax which promotes uptake of the scent. Commercially available materials that can be employed for the pellet include paraffin wax, beeswax, and plant and other biological waxes. Other additives also exist for improving hardness of wax, and these may also be added to the wax of the present invention to assist in stabilising the solid structure of the pellet in cases of high scent concentration.

Typically the scent contained within the pellet will be either a perfume or a concentrated fragrant oil, and may be either of biological origin or be a synthetic scent contained within a suitable substrate. Examples for this are perfumes and aromatic oils. An object of this invention is to dose the scented pellet's bulk material, for instance wax, with a high concentration of scented additive. Accordingly, the scent concentration is limited only by the ability of the bulk material of the pellet to stably hold this scent while at the same time maintaining mechanical strength and solidity, and this concentration depends on choice of bulk material, beneficial strength improving and scent locking additives, and type of scented additive.

In one embodiment of this invention to be described later here, the upper none-inclusive limit of scented additive concentration is the point at which the bulk material looses solidity, for instance becoming a paste.

In another embodiment of this invention to be described later here, the upper limit for scent concentration is exceeded so that the bulk material becomes a paste, and this paste is encapsulated by a solid coating, and for instance wax, and this wax may optionally be chemically or heat treated to reduce the coatings porosity for the purpose of retaining the scented material within the scented inner paste. Encapsulating a solid scented pellet may also be beneficial for adding a colour to an otherwise uncoloured pellet, or for improving long term scent retention.

A colourant may also be incorporated into the pellet for the purpose of colour coding the pellet, or the uncoloured pellet may be coated with a layer of coloured wax for the same purpose, and materials suitable for adding this colour include dyes and pigments. The word *colourant* has been adopted from the American version of English and is intended to mean "to add colour to".

The shape of the pellet is not of particular relevance to the pellet's function as the pellet is melted once introduced into the candle melt. However for ergonomic use and manufacturing ease preferable shapes include spherical, cylindrical, tear-drop, cigar shaped, disc shaped, and oblate shapes. In more general terms, the pellet may be though of as having the shape of any generic "lump".

The size of the pellet is adapted to the size range of the melt pools typically produced in commercially available candles. The size of the pellet in the present invention ranges from sufficiently small enough so that introduction of the pellet into the candle melt pool firstly does not overly increase the volume of the candle's melt pool to the point where the wick becomes swamped, to sufficiently large for ergonomic handling by a human hand and for delivering a sufficient quantity of scent in to the candle's melt pool to raise the melt pool's scent concentration to a level sufficient so that the scent production of the candle is acceptably strong for the consumer. As more than one pellet may be introduced by the consumer to the melt pool of a candle, then the scent pellet size is more relevant to ergonomic human handling and to the avoidance of swamping the wick in smaller candles since larger candles may have several pellets added to dope the melt to a suitable concentration before risking swamping the wick.

One of the advantages of this invention is that a single virgin wax candle may be used to deliver a range of scents, the limitation in this range being the range of available scents provided by the scented pellet in the present invention. Since the scent pellets are of relatively small size, for instance "pea" sized, then a great variety of pellets with different scents may be supplied in a single container, for instance, and if colour coded then the consumer may select a scent from the range supplied and add one or more of these pellets, either of the same scent or a mixture of scents, to the candle's melt pool.

By adding more than one pellet to the candle's melt pool then the concentration of scent in the melt pool may be increased by the consumer to increase the scent production of the candle, and the limit to the number of pellets added is the point at which the total volume of added pellet material leads to swamping of the candle wick and subsequent extinguishing of the candle's flames.

An advantage of this invention is that only the candle melt is doped with the scent so that though the user may add a potentially dangerous amount of scent to the melt pool, for instance by adding multiple pellets at one time, and this may reduce the flash point of the melt pool considerably, then should the candle melt pool ignite then this fire will quickly dissipate as the fragrant material burns out of the melt pool since the fragrant material will not be replaced as would happen in a fully scented candle in which the scent is locked into the candle itself.

A further advantage of this invention is that as the scent is delivered directly to the candle melt, then the bulk material of the candle can be mixed for appearance and strength rather than compromising these for the purpose of also holding scent.

Though candles come in many shapes, the operation of a typical candle remains the same in that a combustible wick is provided which when ignited melts the wax and promotes uptake of the wax by the wick which ignites the wax to produce a flame. The flame melts the wax surrounding the wick into a pool, the *melt pool*, and as the wax in this melt pool is burned it is replaced by wax from the solid part of the candle around the melt. The candle dissipates heat from the melt pool and a dynamic equilibrium is established in which the melt pool remains roughly the same volume and size while the candle burns down and is consumed.

Of particular interest to the present invention are the dynamics of the melt pool, especially the convection currents set up within it. Figure 1 shows a cross-section illustration of a typical melt pool with an example convection current shown as a series of idealised loops 2 which circulate the wax around the melt pool. The flame 1 around the wick 6 provides radiant heat that heats the wax in the melt pool 3. The wax in the melt pool that is closer to the flame is exposed to higher levels of heat radiation and becomes hotter than wax lower down and further away from the

flame and thereby becomes hotter and of a lower density than material lower down in the melt pool and further away from the flame. This sets up a temperature and density gradient in the wax which causes the wax to rise in the centre of the melt pool and then stream off to the outside of the pool before cooling and circulating back to the middle/bottom of the pool where it again rises resulting in the convection currents 2 shown as closed loops here for simplicity. In practice the convection currents are turbulent but the principle stands that the circulating currents promote melting of the scent pellet and mixing of the scent within the melt pool. Once mixed with the wax of the melt pool, the scent delivered by the pellet is slowly released to the air around the operating candle. Figure 1 shows a melt situation in which the melt pool is a portion of the candle so that an interface 4 exists between the melted wax pool and the solid wax of the remainder of the candle. Other situations arise, for instance with a tea-light candle, in which the entire candle is often melted and the shape of the candle is maintained by a container typically provided by a glass or a metal shell.

The scented pellet of the present invention here is introduced into the candle melt pool 3. The convection within the pool assists to quickly melt the pellet and mix the scented material contained within the pellet with the wax of the pool. Once mixed, this scent produces an odour which is delivered to the air in the area or room around the candle in the manner of an ordinary scented candle.

Typically the concentration of scent within the bulk material of the pellet is higher than that found in the wax of a typical scented candle so that the pellet, once melted and mixed in the melt pool, will produce a diluted scent concentration appropriate for producing a sufficient quantity of scent from the candle. So, for instance if the final melt pool has a volume V, the melted pellet has a volume $V/4$, and the melt pool has a volume of Vx3/4, then if the pellet is to produce the fragrance concentration C of an example scented candle's melt pool then the pellet will require to have a fragrance concentration of 4xC in order to produce a melt pool fragrance concentration equal to that of the standard scented candle, at least instantaneously before the scent begins to dissipate.

In practice, the fragrance concentration of the melt pool of a standard scented candle is less than that that of the solid wax of the same scented candle as the scent dissipates from the melt pool and is only slowly replaced by fragrance released in the melting of the main bulk of the candle around the melt pool. By way of example, if an actual concentration ratio of the fragrance in the melt pool to the fragrance in the bulk of a scented candle is 0.25, then the concentration of fragrance in the scent pellet would be C to achieve the same final melt pool fragrance concentration, ie the same as the scent concentration in the wax of the candle. In this example, the scented pellet may then be made smaller and have an accordingly higher concentration in direct ratio to achieve the same effective fragrance concentration in the melt pool. Clearly, the higher the scent concentration in the scent pellet the smaller the required volume of the pellet for the same effective fragrance concentration in the melt pool to which it is added. Accordingly, though not limited thereto, an object of this invention is to maximise the fragrance concentration in the scented pellet to reduce the required volume of the scented pellet for the same concentration of scented material in the melt pool while maintaining the solid structure of the pellet.

Clearly an upper limit exists for the concentration of scented material within the pellet 1 and this limit is dictated by the ability of the bulk material of the pellet to stably hold this scented material while also maintaining the solidity of the pellet during manufacture, transport, storage, and final use of the pellet.

As the pellet in this invention is relatively small compared to the size of a candle, and in particular the pellet is smaller in volume than the volume of the melt pool of the typical candle to which the pellet could be added, then the mechanical strength of the pellet may be smaller than that required for a complete candle as the stresses applied to the pellet during handling are smaller compared to those stresses in a candle. In practice, the strength of the pellet is secondary to the requirement for maximising the stable scent content of the pellet, and the pellet can be quite weak compared to the strength of a typical scented candle. Accordingly, the percentage scented material added to the scent pellet may be higher than that of a scented candle, and may be increased to the limit of the ability of the bulk material to maintain its solidiy.

Another supplementary goal of this invention is to quickly distribute the scented additives of the pellet into the melt pool of the candle. To facilitate rapid melting of the pellet the bulk material of the pellet may be foamed to include gaseous pockets. A foamed pellet has the characteristic that the total weight of material within the volume of the pellet is less than that of a solid pellet of the same size, and the total surface area of the foamed pellet in active contact with the melted wax of the melt pool is greater since the foamed material has a microstructure that is convoluted and hence of a larger surface area than a simple smooth surfaced solid pellet. Rapid melting of a foamed pellet facilitates more rapid introduction of the scented additives into the melt pool and therefore a more rapid production of scent by the candle.

An improvement may be added to the foamed material version of the present invention by encapsulating the foamed material with a wax layer to add mechanical strength to the foamed material and also to give a supplementary benefit of more firmly locking in the scented material within the inner part of the pellet, ie within the foamed bulk material. This may be advantageous in situations where the pellet is highly scented as this scent tends to evaporate out of the pellet, so the encapsulating layer of solid wax being less porous prevents the scent evaporating.

A further advantage of adding a surrounding coat to the bulk material of the pellet is that should colour be desired for the pellet then the coating material may have a colourant such as a dye or pigment added to give the pellet a colour, and in this situation no colour needs to be added to the bulk material of the pellet. Now since the volume of the encapsulating layer may be less than that of the uncoloured inner pellet then the total coloured material added to the pellet is less which leads to less colour being added to the melt pool of the candle to which the pellet is added.

EMBODIMENT A

A preferred embodiment (**EMBODIMENT A**) of the invention will now be described with reference to Figure 2 that shows a simple scented wax pellet in section where the shape of the section is circular to represent a section through a spherical pellet though the shape of the pellet is not limited to being spherical and this shape is chosen by way of example.

The pellet 1 of the present invention comprises a combustible bulk material which produces human safe gaseous combustion products when burned at normal candle burning temperatures, for instance a synthetic wax such as paraffin or a natural wax such as beeswax, and this bulk material makes up the greater part of the mass of the pellet, and into this bulk material has been introduced, and stably mixed, one or more scented additives such as a perfume or fragrant oil of any of the many available scents commercially available and often used in scented candle manufacture. Whilst the invention is not limited thereto, beneficial substances may be mixed within the bulk material for instance to assist in fixing the scented material within the bulk material of the

pellet or to increase the pellet's hardness or ease of handling. Whilst the invention is not limited thereto, a colourant may be added to give the bulk material a colour, for instance to colour code the pellet according to its scent. This colourant may be a dye, pigment, or ink for instance.

Though not limited thereto, the structure of the bulk material of the pellet 1 is preferred to be a homogeneous solid, for instance a crystalline solid, or a foamed solid material, the latter for the purpose of more rapid melting once introduced to the melt pool of the candle, into which scented and other additives are uniformly mixed.

The shape of the pellet 1 may be of any suitable type for manufacture and ergonomic handling by the end user, and for ease of melting in the melt pool (figure 1, 3) of a typical candle. Suitable shapes include spherical, cylindrical, cigar shaped, tear-drop, oblate spheroid, cuboid, cut-off cylinder, disc, and the like. The pellet shape may of any generic "lump" like shape here as it is the volume of the pellet and its ingredients that are off importance to function since the pellet is designed to be melted in the melt pool of a candle after which point the original shape of the pellet is of no significance.

The pellet 1 may be of any suitable size for ergonomic handling by human fingers while being small enough in volume so that when introduced to a candle's melt pool then the volume of the melt pool is not increased to the point where the candle flame is swamped and extinguished, and in the present invention an object is to make the volume of the pellet small compared to the volume of a typical candle's melt pool. However, as an object of this invention is to add an adequate quantity of scented material to a typical candle's melt pool (3, figure 1) to effect a sufficient scent production from the candle while it burns, then the volume of the pellet should be so chosen to include a sufficient quantity of scented material for scenting the candle's melt pool on introduction of one or more scented pellets to this melt pool.

Accordingly a range of volumes and dimensions for the pellet are provided for in this embodiment, for example from 3mm or less maximum dimension for smaller candles through to 20mm or larger for bigger candles. Note that volume and size are not necessarily related since the structure of the pellet could be so chosen that the outside dimension of the pellet is larger than that of a spherical pellet of the same given volume.

The bulk material of the pellet is of a material suitable to hold the scented material and optional colour additives within it at normal room temperatures, is of a material that produces human safe combustion products when burned by a candle once introduced to the candle's melt pool, and this bulk material is selected to have suitable mechanical properties so that the material remains solid at room temperatures while holding these additives until the point at which the pellet is introduced into the candle melt pool which is necessarily at a temperature greater than the melting point of the pellet 1. Accordingly, the bulk material is of a type that has a melting temperature similar to waxes commonly found in commercial manufactured candles, for instance in the range 55 Centrigrade to 90 Centrigrade, so that when the pellet is placed in the candle melt pool then the bulk material melts.

Though not limited thereto, the bulk material is preferably a wax such as paraffin wax or an organic wax such as beeswax, and in particular though not limited thereto this wax may be a wax suited to holding high concentrations of scented oils or perfumes ie concentrations of 3% or more and typically 10% fragrance oil or perfume concentration, such as an organic votive wax.

The scented additive in the present invention may be of any type suitable for mixing with the bulk material of the pellet in the desired concentrations, though clearly additives with a higher concentration of active ingredients will permit a higher maximum scent concentration in the pellet, and the preferred scented additives for the present invention are highly concentrated, for instance perfumes or fragrant oils. The concentration of scented material added to the bulk material is chosen in the present invention to be up to and including the maximum percentage that the chosen bulk material can stably hold while remaining in solid form at room temperatures.

Though not limited thereto, the scented pellet 1 may also contain additives for the purpose of increasing scent uptake and retention, for instance the Vybar product brand which assists to stabilise scents within wax.

Though not limited thereto, the outside surface 2 of the pellet may be treated to increase retention of scent within the pellet for instance by impregnation of the surface by a scent stabiliser, for instance the brand additive Vybar or the like.

Though not limited thereto, the outside surface 2 of the pellet may be heat-treated to reduce porosity and thereby reduce the loss of scent through the surface.

Though not limited thereto, the outer surface 2 of the pellet may be chemically treated for the purpose of reducing its porosity.

Though not limited thereto, the outer surface 2 of the pellet may be chemically treated to give it a colour.

EMBODIMENT B

A second embodiment of this invention (embodiment B) will now be described with reference to figure 3 which shows a cross-section through a pellet, here a spherical pellet showing a circular cross section though the shape of the pellet is not limited to this spherical shape.

In this embodiment of the invention a pellet 1 such as is described in Embodiment A is encapsulated within a material 3 with human safe combustion products when burned in a typical wax candle, for instance a wax such as paraffin wax or an organic wax, for the purposes of either or both increasing the mechanical strength of the material 1 which it encapsulates or locking the scent of the pellet within the central material 1 through the introduction of a less permeable encapsulation layer 3.

Though the thickness of the encapsulating layer may be varied, it is preferred to be small compared to the dimensions of inner pellet 1, and the layer should be reasonably uniform in thickness though uniformity is not a requisite to its function.

Though not limited thereto, the coating material 3 may contain a colourant such as a dye or pigment to give the pellet the coloured appearance for instance to colour code the pellet to its scent, for instance an orange colour for a pellet containing an orange scented additive. By colouring only the outer layer 3 of the pellet then the colour content of the pellet is lower than if the bulk material 1 of the pellet had been coloured which has the

effect of reducing the total volume of colourant added to the melt pool of the candle to which the pellet is added once the pellet's material has mixed with this melt pool.

For the purpose of increasing strength and prevention of scent loss from the central scented material 1, the outer layer 3 need not be scented and an object of the current embodiment is to make this outside layer relatively impervious to migration of the scented material through it, and therefore to lock this scent into the inside bulk material of the pellet 1.

Though not limited thereto, the outer layer 3 may contain beneficial additives for the purpose of increasing its mechanical strength.

Though not limited thereto, the outer layer 3 may contain beneficial additives for the purpose of reducing its porosity.

Though not limited thereto, the outer layer 3 may contain beneficial additives for the purpose of stabilising colourants contained within it such as dyes or pigments.

Though not limited thereto, the outer surface 4 of the pellet may be heat-treated for the purpose of reducing its porosity.

Though not limited thereto, the outer surface 4 of the pellet may be chemically treated for the purpose of reducing its porosity.

EMBODIMENT C

A third embodiment of this invention (embodiment C) will now be described with reference to figure 4 which shows a cross-section through a typical pellet here shown as a cigar shaped pellet in section by way of an example shape though the shape is not limited to this.

In this embodiment of the invention a pellet such as is described in Embodiment B has a bulk material 1 that is overly saturated with scented additives so that the bulk material 1 is a paste. The bulk material of the paste 1 is preferably a wax such as paraffin wax or an organic wax such as beeswax. The paste 1 is encapsulated within a hard combustible material 3 with human-safe combustion products at normal candle burning temperatures, for instance a wax such as paraffin wax or an organic wax such as beeswax, and this encapsulating layer has the purposes of giving the pellet mechanical strength and of locking the scent of the paste 1 within the pellet through the introduction of a solid encapsulation layer 3 which is relatively impervious to the migration of the scented material through it.

Though not limited thereto, the material 3 may contain a colourant such as a dye or pigment to give the pellet a coloured appearance for instance to colour code the pellet to its scent, for instance an orange colour for a paste containing an orange scented additive. By colouring only the outer surface of the pellet then the colour content of the pellet is lower than if the paste 1 of the pellet had been coloured which has the effect of reducing the total quantity of coloured material added to the melt pool of the candle to which the pellet is added once the pellet's material has mixed within this melt pool.

For the purpose of increasing strength and prevention of scent loss from the central paste 1, the outer material 3 need not be scented and an object of the current embodiment is to make this outside coat relatively impervious as possible to migration of the scented material contained within the paste, and therefore to lock this scent into the inside of the pellet.

Though not limited thereto, the outer material 3 may contain beneficial additives for the purpose of increasing its mechanical strength.

Though not limited thereto, the outer material 3 may contain beneficial additives for the purpose of reducing its porosity.

Though not limited thereto, the outer material 3 may contain beneficial additives for the purpose of stabilising coloured additives contained within it such as dyes or pigments.

Though not limited thereto, the outer surface 4 of the pellet may be heat-treated for the purpose of reducing its porosity.

Though not limited thereto, the outer surface 4 of the pellet may be chemically treated for the purpose of reducing its porosity.

EMDOBIMENT D

A final embodiment of this invention (embodiment D) is shown in plan view in figure 5. The pellet 1 is a pellet such as is described in embodiment A or B of this description, however the pellet is so sized and shaped to permit the wick 4 of the candle to which the pellet is added to pass inside the pellet's outer bounding perimeter 2 while at the same time being smaller in diameter relative to the edge 6 of the melt pool 5 into which it is placed but is sized so as to provide a contact at one or more points between the edge 6 of the melt pool of the candle and the pellet 1 so that the range of movement of the pellet within the melt pool is restricted so as to prevent the inner edge 3 of the pellet from coming in close contact with the wick 4. The solid wax 7 of the candle is shown for a cylindrical style candle and this solid part lies outside of the melt pool 5, where the figure shows a plan view of the candle taken at the level of the top of the melt pool looking down the axis of the candle centred on the wick 4.

In this embodiment the pellet is either a complete annulus or is a partial annulus as shown in the figure, and in particular it may be shaped like a horseshoe, and preferably the shape may be a complete or partial circular annulus though oblate shapes are also acceptable. The outer diameter of the pellet is sized so as to be smaller than the diameter of the melt pool into which it is to be added, and as a range of candle sizes are to be accommodated in this invention, then accordingly a range of pellet outer diameters is to be provided for.

By preventing the pellet from coming in close contact with the flame this has the desired effect of reducing the rate of melting of the pellet.

The total volume of the pellet must be kept small relative to the volume of the melt pool in order not to swamp the candle flame when the pellet is added, so since the diameter of the pellet is comparable to the diameter of the melt pool then the thickness of the pellet must be relatively small in order that the total pellet volume be kept small enough so as not to increase the volume of the melt pool to the point where the candle flame is

Also, as the pellet is relatively cool and in is solid when it is added to the melt pool then the pellet is likely to have a higher density than the melt and will likely come to rest on the bottom of the melt pool, and since the bottom of the melt is relatively cooler with respect to the surface layers of the melt pool then the bottom location of the pellet assists in reducing the rate of melting of the pellet leading to a more gradual release of the scented additives within the pellet and less likelihood of the candle wick being swamped.

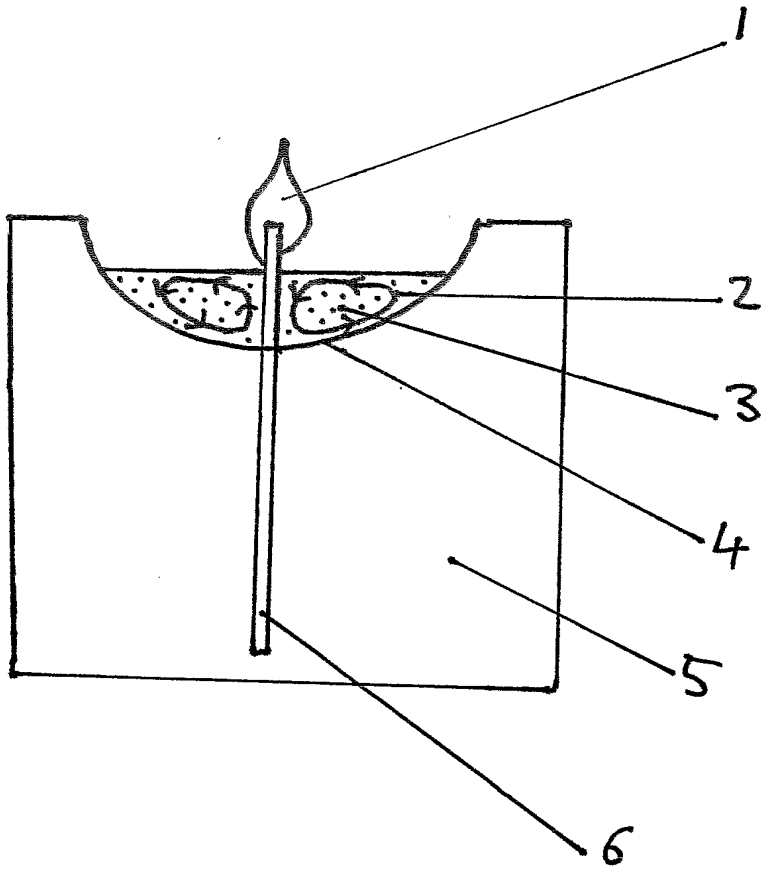

Figure 1

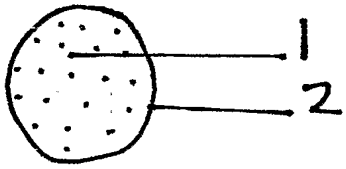

Figure 2

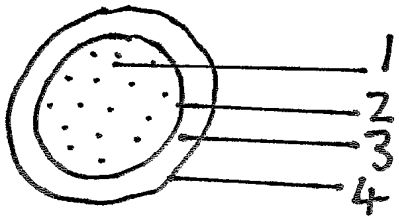

Figure 3

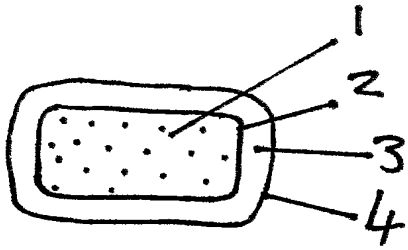

Figure 4

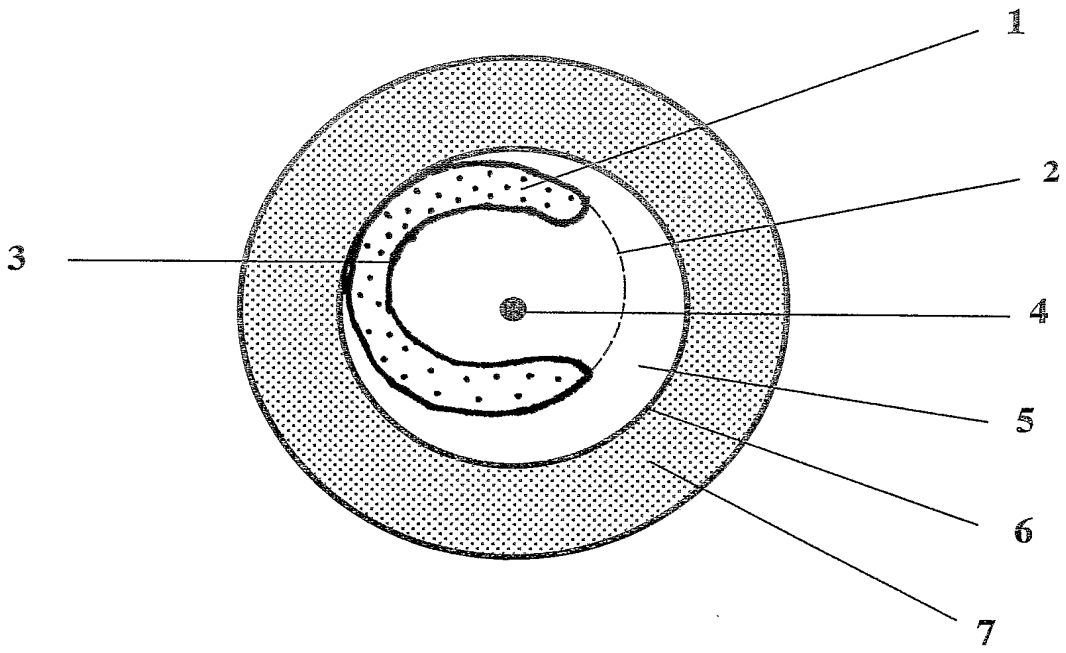

Figure 5